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Ecological Intensification in "Livestock - Local Development" Interaction

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Introduction

Livestock is on the global agenda to address nutritional issues or food security but also environmental challenges. Global governance is exploring solutions, make recommendations for sustainable livestock. Ecological intensification (Bommarco *et al.*, 2013) emerges as a key concept to redefine the animal breeding research. But how this concept can be declined at the local scale? The MOUVE project (livestock, local development and the ecological intensification movement) aimed to better understand the ecological intensification in the interaction between livestock and local development especially regarding landscape, supply chains and stakeholders' expectations. The project concerned rangeland areas where the classic intensification has had a limited impact, for bioclimatic, social and political reasons, as well as due to the nature of the zones and institutional dynamics.

Conceptual Framework

Ecological intensification acts in both the scientific and political domain to respond to agricultural challenges focused on food production and environment impact. Ecological intensification intersects with other concepts such as sustainable intensification (Garnett *et al.*, 2013), and agroecology (Francis *et al*., 2003).

"Livestock - local development" interaction was analyzed in three topics: relationship between livestock and natural resources; livestock diversity and dynamics; identities and collective actions. According to Morales & Dieguez (2009), four drivers of change were analyzed: policies at local scale, value chain strategies, collective actions affecting livestock, and family-farm dynamics. Finally, we assumed that local scale involves diverse points of view on what livestock is waited for.

Materials and Methods

Based on interdisciplinary and comparative analysis, our approach combined a set of methods to better understand the changes at the local scale, especially diverse expectations of stakeholders regarding livestock, livestock governance, collective actions, ecosystem services and future scenarios. Eight rangeland areas were selected in Europe (Alps, Pyrenees, Massif Central), Mediterranean (Morocco and South of France), West Africa (North Senegal Sahel) and South America (Pampa and Eastern Amazon). Interviewed stakeholders were breeders, traders, staff of agro-industries, staff of development, financial agencies, environmental NGO leaders, local authorities.

Results

Stakeholders' responses show four main functions of livestock at the local scale: food security for breeders, commodities for food chains and industries, local development factor, and environmental impact. However, they have different hopes and fears regarding livestock, sometimes leading to conflicts on what the future of livestock should be at the local scale. Debates mainly focus on the five following topics: intensification pathways for the livestock emblematic model, coexistence of different livestock and food models, livestock and landscape interactions, future of farming, tradition and local knowledge. The image of livestock is currently acute due to the current criticism about environmental impacts of animal breeding, especially extensive farming based on pasture. Breeders usually do not understand this criticism which

contributes to depress their identity, forcing new models and strongly reducing the attractiveness of livestock for young people.

Livestock policy analysis shows the strengthening of market in the building of food safety norms in the 80s and 90s, and more recently environmental norms (which cannot avoid greenwashing cases). In Europe public norms play a key role. In South countries, big chains (notably involved into international markets) are proactive regarding environmental improvements. Regarding supply and market chains, we noticed the frequent coexistences of long chain turned on to national / international markets, focused on price competitivity and local chains, valorizing traditions, knowledge, grazing, and driven by local people. But the equilibriums between the two models are dynamics and rather complex.

Family farms dominate in rangeland areas and continue to define the future at local scale. However, the family-livestock links are becoming less strong than in the past. The changes are in the origin of holders of new investments, in the land-use, in more contracted labor, weight of livestock in farm income and multi-activity.

Three kinds of collective actions were identified: building by local leaders to adapt livestock to environmental norms (case of *Green County* in the Amazon); incentive by supply chains to better valorize livestock products; complex systems joining several governance focused on environmental challenges. Collectives actions usually have positive a footprint (Morris & Kirwan, 2011), but not necessary in the ecological way.

The analysis of farms long term trajectories shows three patterns: stable, changing from time to time (every 10 – 15 years) and labile (very sensitive notably to local market signs). The "changing" trajectory can be defined as for example conversion to organic production, but usually the change is just going with radical changes affecting farm objectives, labor force, combining of activities.

Ecosystem services (MEA, 2005) strengthen the functions of ecosystems out of forage production. A toolbox for comparative analyze of rangeland ecosystem services was built based on agro-ecological metrics and used to assess the consequences of breeders' decisions regarding grazing.

Discussion and Conclusions

Approach to define diverse expectations on livestock is relevant and was applied in other research sites. Set of methods to assess long-term dynamics was also essential to understand the combinations of drivers of change, either global or local. Ecological intensification, as a technical message holding food security and environmental trade-offs, should be though with other issues such as land-use changes, landownership, market, attractiveness of the profession, livestock policy, farming future trends etc. Global messages are somewhere rather consensual. But the pathways to the future of livestock farming can be subjects of deep conflicts or un-understandings between local stakeholders, playing as lock-in factors. Participative scenario methodologies with stakeholders can help stakeholders to research common understandings on pathways and impacts. Some complementary research could be developed to better define expectations of consumers and urban populations and to include more intensive rangeland case studies.

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